PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-327397

(43)Date of publication of application : 08.12.1998

(51)Int.Cl.	HO4N 7/173
	HO4H 1/02
	HO4L 12/40
	HO4N 7/16

(21)Application number : 09-135038

(22)Date of filing : 26.05.1997

(71)Applicant : HITACHI LTD

(72)Inventor : TAKAHASHI TERUYUKI
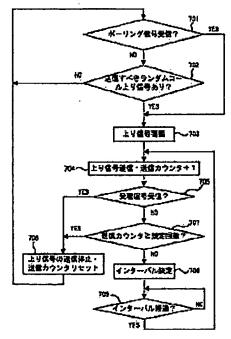YAMADA YOSHIHIRO
TANAKA HIROMI

(54) TWO-WAY CABLE COMMUNICATION METHOD AND TWO-WAY CABLE COMMUNICATION SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To solve collision in a short time in the case that incoming signals from pluralities of terminal equipments collide with each other in a 2-way cable communication system.

SOLUTION: In the case of sending an incoming signal to a central controller, a terminal equipment stores an incoming signal in the inside, till the reception signal of a reply with respect to the incoming call signal is received from the central coefficient, or the number of times reaches a predetermined transmission number, the incoming call signal having been stored inside is repetitively sent to the central controller at a time interval decided depending on a random number generated based on a value specifically decided in the terminal equipment. Thus, even when incoming call signals from pluralities of the terminal equipments collide with each other, a timing when the incoming call signal is sent next from the terminal equipments is deviated and the collision of consecutive incoming call signals is avoided in a short time.

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A prime controller.
Two or more terminal units.
The transmission line which connects between the above-mentioned prime controller and two or
more above-mentioned terminal units.
Are the above the bidirectional cable correspondence procedure which it had, and two or more
above-mentioned terminal units, When there is information which should be notified to the
above-mentioned prime controller respectively, a notification signal which shows this information,
After accumulating in an inside, transmit to the above-mentioned prime controller and the
above-mentioned prime controller, When a notification signal is received from one of terminal
units, until a terminal unit which transmitted an acceptance signal to this terminal unit, and
transmitted the above-mentioned notification signal receives an acceptance signal from the
above-mentioned prime controller, Or repeating transmission of the value which defined a
notification signal accumulated in an inside peculiar to this terminal unit is carried out to the
above-mentioned prime controller with a time interval determined according to a random number
by which it was generated as a seed until it becomes transmission frequency defined beforehand.

[Claim 2]Are the bidirectional cable correspondence procedure according to claim 1, and the
above-mentioned prime controller with a time interval defined beforehand. Transmit to each of
two or more above-mentioned terminal units, and a polling signal two or more above-mentioned
terminal units, Respectively, when a polling signal is received from the above-mentioned prime
controller, a polling reply signal which shows an answer to this polling signal, After accumulating
in an inside, transmit to the above-mentioned prime controller and the above-mentioned prime
controller, When a polling reply signal is received from a terminal unit which received the above-
mentioned polling signal, until a terminal unit which transmitted an acceptance signal to this
terminal unit, and transmitted the above-mentioned polling reply signal receives an acceptance
signal from the above-mentioned prime controller, Or a bidirectional cable correspondence
procedure carrying out repeating transmission of the value which defined a polling reply signal
accumulated in an inside peculiar to this terminal unit to the above-mentioned prime controller
with a time interval determined according to a random number by which it was generated as a
seed until it becomes transmission frequency defined beforehand.
[Claim 3]When it is the bidirectional cable correspondence procedure according to claim 2 and
the above-mentioned prime controller receives a notification signal from one of terminal units,
Or a bidirectional cable correspondence procedure characterized by resuming transmission of
the above-mentioned polling signal after time or arbitrary time which suspended transmission of
the above-mentioned polling signal and were set beforehand pass, when abnormalities are
detected inside [which was received from one of terminal units] a notification signal.
[Claim 4]A bidirectional cable correspondence procedure which is the bidirectional cable
correspondence procedure according to claim 2, and is characterized by the above-mentioned
prime controller changing a time interval which transmits the above-mentioned polling signal
according to receiving frequency of the above-mentioned notification signal.

[Claim 5]A prime controller.
Two or more terminal units.
The transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units.
Are the bidirectional cable correspondence procedure provided with the above, and the above-mentioned prime controller with a time interval defined beforehand. Transmit to each of two or more above-mentioned terminal units, and a polling signal two or more above-mentioned terminal units, Respectively, when a polling signal is received from the above-mentioned prime controller, a polling reply signal which shows an answer to this polling signal, After accumulating in an inside, when there is information which should be transmitted to the above-mentioned prime controller, and should be notified to the above-mentioned prime controller, After accumulating a notification signal which shows this information in an inside, it transmits to the above-mentioned prime controller, When the above-mentioned prime controller receives a polling reply signal from a terminal unit which received the above-mentioned polling signal, When an acceptance signal is transmitted to this terminal unit and a notification signal is received from one of terminal units, Until a terminal unit which transmitted an acceptance signal to this terminal unit, and transmitted a signal to the above-mentioned prime controller receives an acceptance signal from the above-mentioned prime controller, or, when repeating transmission of the signal accumulated in an inside is carried out to the above-mentioned prime controller with a time interval defined beforehand and the above-mentioned prime controller receives a notification signal from one of terminal units until it becomes transmission frequency defined beforehand, When abnormalities are detected inside [which was received from one of terminal units] a notification signal, transmission of the above-mentioned polling signal is suspended, and after time or arbitrary time which were set beforehand pass, transmission of the above-mentioned polling signal is resumed.

[Claim 6]In a bidirectional cable communication system which consists of the transmission line which connects between a prime controller, two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units, the above-mentioned prime controller with a time interval defined beforehand. Transmit to each of two or more above-mentioned terminal units, and a polling signal two or more above-mentioned terminal units, Respectively, when a polling signal is received from the above-mentioned prime controller, a polling reply signal which shows an answer to this polling signal, After accumulating in an inside, when there is information which should be transmitted to the above-mentioned prime controller, and should be notified to the above-mentioned prime controller, After accumulating a notification signal which shows this information in an inside, it transmits to the above-mentioned prime controller, When the above-mentioned prime controller receives a polling reply signal from a terminal unit which received the above-mentioned polling signal, When an acceptance signal is transmitted to this terminal unit and a notification signal is received from one of terminal units, A signal accumulated in an inside with a time interval defined beforehand until a terminal unit which transmitted an acceptance signal to this terminal unit, and transmitted a signal to the above-mentioned prime controller receives an acceptance signal from the above-mentioned prime controller, or until it becomes transmission frequency defined beforehand. A bidirectional cable correspondence procedure, wherein it carries out repeating transmission to the above-mentioned prime controller and the above-mentioned prime controller changes a time interval which transmits the above-mentioned polling signal according to receiving frequency of the above-mentioned notification signal.
[Claim 7]It is the bidirectional cable correspondence procedure according to claim 1, 2, 3, 4, 5, or 6, A bidirectional cable correspondence procedure, wherein a priority transmits a signal which gives a priority to a signal which the above-mentioned prime controller should transmit to each of two or more above-mentioned terminal units, is accumulated in an inside, and is accumulated in an inside to high order to a terminal unit which should transmit this signal.
[Claim 8]A prime controller.
The transmission line which connects between two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units.

Are the above the bidirectional cable communication system which it had, and the above-mentioned prime controller, The 1st reception means that receives a signal transmitted from the above-mentioned terminal unit, and a generating means which generates an acceptance signal when a signal which the 1st reception means of the above received is a normal signal, Have the 1st transmitting means that transmits an acceptance signal which the above-mentioned generating means generated to a terminal unit of transmitting [a signal which the 1st reception means of the above received] origin, and two or more above-mentioned terminal units, The 2nd reception means that receives respectively a signal transmitted from the above-mentioned prime controller, The 2nd generating means that generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, An accumulation means which accumulates a notification signal which the 2nd generating means of the above generated, and a random number generation means to generate a random number by using as a seed a value defined peculiar to self, A notification signal which the above-mentioned accumulation means is accumulating with a time interval determined according to a random number which the above-mentioned random number generation means generated. it having the 2nd transmitting means that carries out repeating transmission to the above-mentioned prime controller, and a counting means which calculates transmission frequency to which the 2nd transmitting means of the above transmitted a signal, and the 2nd transmitting means of the above, when transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, When the 2nd reception means of the above receives an acceptance signal, repeating transmission to the above-mentioned prime controller is suspended.

[Claim 9]A prime controller.
The transmission line which connects between two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units.
Are the above the bidirectional cable communication system which it had, and the above-mentioned prime controller, With a time interval beforehand determined as the 1st reception means that receives a signal transmitted from the above-mentioned terminal unit. The 1st generating means that generates a polling signal, and the 2nd generating means that generates an acceptance signal when a signal which the 1st reception means of the above received is a normal signal, Transmit to each of two or more above-mentioned terminal units, and a polling signal which the 1st generating means of the above generated. Have the 1st transmitting means that transmits an acceptance signal which the 2nd generating means of the above generated to a terminal unit of transmitting [a signal which the 1st reception means of the above received] origin, and two or more above-mentioned terminal units, The 2nd reception means that receives respectively a signal transmitted from the above-mentioned prime controller, The 3rd generating means that generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, The 4th generating means that generates a polling reply signal which shows an answer to this polling signal when the 2nd reception means of the above receives a polling signal, An accumulation means which accumulates a polling reply signal which a notification signal and the 4th generating means of the above which the 3rd generating means of the above generated generated, and a random number generation means to generate a random number by using as a seed a value defined peculiar to self, A signal which the above-mentioned accumulation means is accumulating with a time interval determined according to a random number which the above-mentioned random number generation means generated. Have the 2nd transmitting means that carries out repeating transmission to the above-mentioned prime controller, and a counting means which calculates transmission frequency to which the 2nd transmitting means of the above transmitted a signal, and the 2nd transmitting means of the above, When transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, or when the 2nd reception means of the above receives an acceptance signal, repeating transmission to the above-mentioned prime controller is suspended.

[Claim 10]When it is the bidirectional cable communication system according to claim 9 and, as for the above-mentioned prime controller, the 1st reception means of the above receives a notification signal, Or when a notification signal which the 1st reception means of the above received is an unusual signal, A bidirectional cable communication system having further a polling control means to stop generating of a polling signal by the 1st generating means of the above, and to make generating of a polling signal by the 1st generating means of the above resume after time or arbitrary time which were set beforehand pass.

[Claim 11]When it is the bidirectional cable communication system according to claim 9 and, as for the above-mentioned prime controller, the 1st reception means of the above receives a notification signal, Or when a notification signal which the 1st reception means of the above received is an unusual signal, A bidirectional cable communication system having further a polling space change means to return a time interval which changed greatly a time interval in which the 1st generating means of the above generates a polling signal, and was changed after time or arbitrary time which were set beforehand passed.

[Claim 12]A terminal unit which is provided with the following and characterized by the above-mentioned transmitting means suspending repeating transmission to the above-mentioned prime controller when transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, or when the above-mentioned reception means receives an acceptance signal.

A prime controller.

Two or more terminal units.

It consists of the transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units, A reception means which is a terminal unit used in a bidirectional cable communication system which transmits an acceptance signal to a terminal unit of transmitting [this signal] origin when a signal which the above-mentioned prime controller received from the above-mentioned terminal unit is a normal signal, and receives a signal transmitted from the above-mentioned prime controller.

A generating means which generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, An accumulation means which accumulates a notification signal which the above-mentioned generating means generated, and a random number generation means to generate a random number by using as a seed a value defined peculiar to self, A transmitting means which carries out repeating transmission of the notification signal which the above-mentioned accumulation means is accumulating to the above-mentioned prime controller with a time interval determined according to a random number which the above-mentioned random number generation means generated, and a counting means which calculates transmission frequency to which the above-mentioned transmitting means transmitted a signal.

[Claim 13]A terminal unit which is provided with the following and characterized by the above-mentioned transmitting means suspending repeating transmission to the above-mentioned prime controller when transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, or when the above-mentioned reception means receives an acceptance signal.

A prime controller.

Two or more terminal units.

Consist of the transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units, and the above-mentioned prime controller with a time interval defined beforehand. Transmit a polling signal to each of two or more above-mentioned terminal units, and. A reception means which is a terminal unit used in a bidirectional cable communication system which transmits an acceptance signal to a terminal unit of transmitting [this signal] origin when a signal received from the above-mentioned terminal unit is a normal signal, and receives a signal transmitted from the above-mentioned prime controller. The 1st generating means that generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, The 2nd

generating means that generates a polling reply signal which shows an answer to this polling signal when the above-mentioned reception means receives a polling signal, An accumulation means which accumulates a polling reply signal which a notification signal and the 2nd generating means of the above which the 1st generating means of the above generated generated, A signal which a random number generation means to generate a random number by using as a seed a value defined peculiar to self, and the above-mentioned accumulation means are accumulating with a time interval determined according to a random number which the above-mentioned random number generation means generated. A transmitting means which carries out repeating transmission to the above-mentioned prime controller, and a counting means which calculates transmission frequency to which the above-mentioned transmitting means transmitted a signal.

[Claim 14]A prime controller characterized by comprising the following, and two or more terminal units, It consists of the transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units, A prime controller used in a bidirectional cable communication system which transmits a notification signal which shows this information to the above-mentioned prime controller when there is information which two or more above-mentioned terminal units should notify to the above-mentioned prime controller respectively.
A reception means which receives a signal transmitted from the above-mentioned terminal unit. The 1st generating means that generates a polling signal in a time interval defined beforehand. The 2nd generating means that generates an acceptance signal when a signal which the above-mentioned reception means received is a normal signal.
Transmit to each of two or more above-mentioned terminal units, and a polling signal which the 1st generating means of the above generated. When a transmitting means which transmits an acceptance signal which the 2nd generating means of the above generated to a terminal unit of transmitting [a signal which the above-mentioned reception means received] origin, and the above-mentioned reception means receive a notification signal, Or a polling control means to stop generating of a polling signal by the 1st generating means of the above, and to make generating of a polling signal by the 1st generating means of the above resume when a notification signal which the above-mentioned reception means received is an unusual signal after time or arbitrary time which were set beforehand pass.

[Claim 15]It consists of the transmission line which connects between a prime controller, two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units, When there is information which two or more above-mentioned terminal units should notify to the above-mentioned prime controller respectively, Are a prime controller used in a bidirectional cable communication system which transmits a notification signal which shows this information to the above-mentioned prime controller, and with a time interval beforehand determined as a reception means which receives a signal transmitted from the above-mentioned terminal unit. The 1st generating means that generates a polling signal, and the 2nd generating means that generates an acceptance signal when a signal which the above-mentioned reception means received is a normal signal, Transmit to each of two or more above-mentioned terminal units, and a polling signal which the 1st generating means of the above generated. When a transmitting means which transmits an acceptance signal which the 2nd generating means of the above generated to a terminal unit of transmitting [a signal which the above-mentioned reception means received] origin, and the above-mentioned reception means receive a notification signal, Or when a notification signal which the above-mentioned reception means received is an unusual signal, after time or arbitrary time when the 1st generating means of the above changed greatly a time interval which generates a polling signal at, and defined it beforehand pass, A prime controller provided with a polling space change means to return a changed time interval.
[Claim 16]A prime controller.
The transmission line which connects between two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units.

A generating means which generates a signal which is the prime controller provided with the above and should be transmitted to each of two or more above-mentioned terminal units, A priority has two or more transmission queue given respectively, and a priority a signal stored in high transmission queue, It has a transmitting means which transmits preferentially to a terminal unit which should transmit this signal, and the above-mentioned generating means stores a generated signal in transmission queue with which a priority according to this signal is given.

[Claim 17]characterized by comprising — it needs — it is made to function, and when transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, the above-mentioned transmitting means, Or a recording medium in which machinery reading is possible, wherein a program for making it function as suspending repeating transmission to the above-mentioned prime controller when the above-mentioned reception means receives an acceptance signal is recorded.
A prime controller.
Two or more terminal units.
It consists of the transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units, A reception means which receives a signal to which a terminal unit used in a bidirectional cable communication system which transmits an acceptance signal to a terminal unit of transmitting [this signal] origin when a signal which the above-mentioned prime controller received from the above-mentioned terminal unit is a normal signal was transmitted from the above-mentioned prime controller.
A generating means which generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, An accumulation means which accumulates a notification signal which the above-mentioned generating means generated, and a random number generation means to generate a random number by using as a seed a value defined peculiar to self, A transmitting means which carries out repeating transmission of the notification signal which the above-mentioned accumulation means is accumulating to the above-mentioned prime controller with a time interval determined according to a random number which the above-mentioned random number generation means generated, and a counting means which calculates transmission frequency to which the above-mentioned transmitting means transmitted a signal.

[Claim 18]characterized by comprising — it needs — it is made to function, and when transmission frequency which the above-mentioned counting means calculated reaches the number of times defined beforehand, the above-mentioned transmitting means, Or a recording medium in which machinery reading is possible, wherein a program for making it function as suspending repeating transmission to the above-mentioned prime controller when the above-mentioned reception means receives an acceptance signal is recorded.
A prime controller.
Two or more terminal units.
Consist of the transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units, and the above-mentioned prime controller with a time interval defined beforehand. Transmit a polling signal to each of two or more above-mentioned terminal units, and. A reception means which receives a signal to which a terminal unit used in a bidirectional cable communication system which transmits an acceptance signal to a terminal unit of transmitting [this signal] origin when a signal received from the above-mentioned terminal unit is a normal signal was transmitted from the above-mentioned prime controller.
The 1st generating means that generates a notification signal which shows this information when there is information which should be notified to the above-mentioned prime controller, The 2nd generating means that generates a polling reply signal which shows an answer to this polling signal when the above-mentioned reception means receives a polling signal, An accumulation means which accumulates a polling reply signal which a notification signal and the 2nd generating means of the above which the 1st generating means of the above generated generated, A signal

which a random number generation means to generate a random number by using as a seed a value defined peculiar to self, and the above-mentioned accumulation means are accumulating with a time interval determined according to a random number which the above-mentioned random number generation means generated. A transmitting means which carries out repeating transmission to the above-mentioned prime controller, and a counting means which calculates transmission frequency to which the above-mentioned transmitting means transmitted a signal.

[Claim 19]It consists of the transmission line which connects between a prime controller, two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units, When there is information which two or more above-mentioned terminal units should notify to the above-mentioned prime controller respectively, With a time interval beforehand determined as a reception means which receives a signal to which a prime controller used in a bidirectional cable communication system which transmits a notification signal which shows this information to the above-mentioned prime controller was transmitted from the above-mentioned terminal unit. The 1st generating means that generates a polling signal, and the 2nd generating means that generates an acceptance signal when a signal which the above-mentioned reception means received is a normal signal, Transmit to each of two or more above-mentioned terminal units, and a polling signal which the 1st generating means of the above generated. When a transmitting means which transmits an acceptance signal which the 2nd generating means of the above generated to a terminal unit of transmitting [a signal which the above-mentioned reception means received] origin, and the above-mentioned reception means receive a notification signal, Or when a notification signal which the above-mentioned reception means received is an unusual signal, after time or arbitrary time which were made to suspend generating of a polling signal by the 1st generating means of the above, and were set beforehand pass, A recording medium in which machinery reading is possible, wherein a program for making it function as having a polling control means to make generating of a polling signal by the 1st generating means of the above resume is recorded.
[Claim 20]It consists of the transmission line which connects between a prime controller, two or more terminal units, and the above-mentioned prime controller and two or more above-mentioned terminal units, When there is information which two or more above-mentioned terminal units should notify to the above-mentioned prime controller respectively, With a time interval beforehand determined as a reception means which receives a signal to which a prime controller used in a bidirectional cable communication system which transmits a notification signal which shows this information to the above-mentioned prime controller was transmitted from the above-mentioned terminal unit. The 1st generating means that generates a polling signal, and the 2nd generating means that generates an acceptance signal when a signal which the above-mentioned reception means received is a normal signal, Transmit to each of two or more above-mentioned terminal units, and a polling signal which the 1st generating means of the above generated. When a transmitting means which transmits an acceptance signal which the 2nd generating means of the above generated to a terminal unit of transmitting [a signal which the above-mentioned reception means received] origin, and the above-mentioned reception means receive a notification signal, Or when a notification signal which the above-mentioned reception means received is an unusual signal, after time or arbitrary time when the 1st generating means of the above changed greatly a time interval which generates a polling signal at, and defined it beforehand pass, A recording medium in which machinery reading is possible, wherein a program for making it function as having a polling space change means to return a changed time interval is recorded.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the bidirectional cable communication system
which makes representation the CATV communication system using a joint listening-and-
watching institution, and in order to realize video-on-demand (VOD) service especially, it relates
to suitable art.
[0002]
[Description of the Prior Art]In the bidirectional cable communication system which generally
consists of the transmission line which connects between these with a prime controller and two
or more terminal units, The "polling" which is a communication method with which the terminal
unit transmitted the signal (uphill signal) from the prime controller to the prime controller to the
timing given by the signal (getting down signal) is adopted.
[0003]Hereafter, the communication which adopted "polling" is explained.
[0004]In the communication which adopted "polling", a prime controller transmits a polling signal
including the identification number of the terminal unit which it gets down and is first made
applicable to polling on the transmission line to all the terminal units.
[0005]Even if the terminal unit which has identification numbers other than the identification
number contained in the polling signal receives a polling signal, it disregards this.
[0006]The terminal unit which has the identification number contained in the polling signal will
transmit to a prime controller as an answer to the polling signal which received the polling reply
signal including the information which should be notified to an own identification number and
prime controller, if a polling signal is received.
[0007]Then, if a polling reply signal is received, based on the information which considers that
communication was successful and is included in the received polling reply signal, a prime
controller will perform internal processing, if it is required, and will move the candidate for polling
to the following terminal unit after that.
[0008]When a polling reply signal is not able to be received, a prime controller considers that the
terminal unit for polling is an error terminal, performs error registration, and moves the candidate
for polling to the following terminal unit after that.
[0009]on the other hand, the prime controller may need to transmit information to each terminal
unit, and, in such a case, included such information (specifically, it is the information for setting
up the inside information of each terminal unit.) apart from the polling signal —— it gets down and
a signal is transmitted. It gets down, when this going-down signal is aimed at this specific
terminal unit, the identification number of the target terminal unit is contained, and for all the
terminal units, when it is a thing, the special identification number which shows all the terminal
units is contained in a signal.
[0010]Then, this terminal unit that got down and received the signal performs processing which
sets up inside information according to the information included in this going-down signal.
[0011]For example, although the transmission line with which the image and the sound which is
contents of broadcast are transmitted is also built in the transmission line (coaxial cable) which
connects between a prime controller and terminal units in the CATV system, The information

which shows the channel of these contents of broadcast will be included and transmitted to the going-down signal mentioned above.

[0012]The processing flow chart which shows the flow of operation of the prime controller explained above is as being shown in drawing 9 (a).

[0013]That is, in drawing 9 (a), Step 901 is processing which transmits a polling signal. Step 902 is it processing to distinguish whether the polling reply signal was received, and Step 903, It is the processing which performs error registration, and Step 904 is processing which moves the candidate for polling to the following terminal unit, and Step 600 shows the signal transmission processing for terminal setup which shows a detailed processing flow chart in drawing 6.

[0014]Here, in drawing 6, Step 601 is processing which distinguishes whether it is necessary to set up the inside information of one of terminal units.
Step 602 shows the processing including the information for setting up the inside information of this terminal unit which gets down and transmits a signal (signal for terminal setup).

[0015]In the processing flow chart shown in drawing 9 (a), if a prime controller fails in reception of a polling reply signal once, it will consider that the terminal unit for polling is an error terminal, but. Even if reception of a polling reply signal goes wrong, as long as only the number of times defined beforehand repeats transmission of a polling signal and can receive a polling reply signal even once in it, it may be made to consider that communication was successful.

[0016]Drawing 9 (b) is a figure showing the sequence in the case of performing communication which adopted "polling."

[0017]In drawing 9 (b), 921 is the polling signal transmitted to the terminal unit from the prime controller, and the polling reply signal transmitted to the prime controller from the terminal unit as an answer of as opposed to the polling signal 921 in 911.

[0018]
[Problem(s) to be Solved by the Invention]In the communication which adopted the "polling" mentioned above. Since a polling signal is transmitted to each terminal unit and a terminal unit transmits a polling reply signal to a prime controller as an answer to a polling signal, a prime controller, Although there is an advantage that a prime controller can discover the abnormalities of the transmission line, Since a prime controller is the turn registered beforehand and the terminal unit for polling is moved, especially, when there are many terminal units, There is a fault of taking time before the information which each terminal unit should notify to a prime controller is actually notified to a prime controller by the polling reply signal.

[0019]By the way, as one of the communication methods adopted with the communications system which consists of the transmission line which connects between these with a prime controller and two or more terminal units, When there is information which each terminal unit should notify to a prime controller, there is a communication method which transmitted the going-up signal including this information spontaneously to the prime controller.

[0020]In this Description, such a communication method is made to call it a "random call method."

[0021]Hereafter, the communication which adopted the "random call method" is explained.

[0022]In the communication which adopted the "random call method", a terminal unit transmits spontaneously a random call going-up signal including the identification number of this information and self to a prime controller, when there is information which should be notified to a prime controller.

[0023]Then, to the terminal unit which the identification number contained in the random call going-up signal shows, i.e., the terminal unit of transmitting [a random call going-up signal] origin, if a random call going-up signal is received and the prime controller is required, it will perform internal processing and will transmit a random call going-down signal.

[0024]Also in the communication which adopted the "random call method", like the communication which adopted "polling", a prime controller transmits the signal for terminal setup to the target terminal unit, when the information for setting up the inside information of each

terminal unit needs to be transmitted.
[0025]The processing flow chart which shows the flow of operation of the prime controller explained above is as being shown in drawing 10 (a).
[0026]Namely, in drawing 10 (a) Step 1001, It is the processing which distinguishes whether the random call going-up signal was received, and Step 1002 is processing which transmits a random call going-down signal, and Step 600 shows the signal transmission processing for terminal setup which showed the detailed processing flow chart in drawing 6.
[0027]Drawing 10 (b) is a figure showing the sequence in the case of performing communication which adopted the "random call method."
[0028]In drawing 10 (b), the random call going-up signal with which 1011 was transmitted to the prime controller from the terminal unit, and 1021 are the random call going-down signals transmitted to the terminal unit from the prime controller.
[0029]In the communication which adopted the "random call method" mentioned above. Since each terminal unit transmits a random call going-up signal spontaneously to a prime controller, there is an advantage that the information which each terminal unit should notify to a prime controller is immediately notified by the random call going-up signal to a prime controller, but. There is a fault that a prime controller cannot discover the abnormalities of the transmission line.
[0030]Although the "random call method" was not conventionally adopted with a bidirectional cable communication system, When a bidirectional cable communication system tends to realize VOD service especially, When the "random call method" was adopted and the user of a terminal unit performs a service request, since inside information is changed, this terminal unit becomes possible [notifying immediately the information which shows that to a prime controller with a random call going-up signal], and is effective.
[0031]From this, "polling" and a "random call method" are used together, and the art with which the fault of both communication methods was compensated mutually is indicated by JP,H5-161138,A.
[0032]However, although there is a fault that there is a possibility that the random call going-up signal from two or more terminal units may collide, further in the communication which adopted the "random call method", Although the technique for avoiding a collision is described by the art currently indicated by the above-mentioned gazette, It is not considered about a solution when it cannot be avoided that two or more terminal units transmit a random call going-up signal simultaneously thoroughly and a random call going-up signal collides by a certain cause.
[0033]Although the communication method which a terminal unit goes up to a prime controller, and transmitted the signal spontaneously is called the "terminal firing method" in the above-mentioned gazette, it is a communication method of the same structure as the communication method currently called the "random call method" on these Descriptions.
[0034]Then, in the bidirectional cable communication system which used together the bidirectional cable communication system with which the "random call method" was used for the purpose of this invention, "polling", and a "random call method", It is in enabling respectively communication effective in order to realize VOD service especially by providing the art which made it possible to solve it for a short time when the going-up signal from two or more terminal units collides which does not spoil a sex instancy.
[0035]
[Means for Solving the Problem]First, as the 1st mode, this invention provides a bidirectional cable correspondence procedure for solving it for a short time, when a going-up signal from two or more terminal units collides in a bidirectional cable communication system which adopted a "random call method."
[0036]Namely, in a bidirectional cable communication system this invention is characterized by that comprises the following, When there is information which two or more above-mentioned terminal units should notify to the above-mentioned prime controller respectively, After accumulating a notification signal which shows this information in an inside, it transmits to the above-mentioned prime controller, When the above-mentioned prime controller receives a notification signal from one of terminal units, until a terminal unit which transmitted an

acceptance signal to this terminal unit, and transmitted the above-mentioned notification signal receives an acceptance signal from the above-mentioned prime controller, Or a bidirectional cable correspondence procedure carrying out repeating transmission of the value which defined a notification signal accumulated in an inside peculiar to this terminal unit to the above-mentioned prime controller with a time interval determined according to a random number by which it was generated as a seed until it becomes transmission frequency defined beforehand.
As the 1st mode, it is a prime controller.
Two or more terminal units.
The transmission line which connects between the above-mentioned prime controller and two or more above-mentioned terminal units.

[0037]In the 1st mode, since a "random call method" is adopted, real-time communication to a prime controller is attained from a terminal unit.
[0038]In the 1st mode, since a terminal unit does not receive an acceptance signal when a prime controller does not receive a notification signal (it is equivalent to a random call going-up signal mentioned above.) which self transmitted, it will carry out repeating transmission of the notification signal to a prime controller. Then, even if a terminal unit carries out [only the number of times defined beforehand] repeating transmission of the notification signal to a prime controller, when an acceptance signal is not received from a prime controller, it becomes possible to detect that failure occurred in a prime controller or the transmission line.
[0039]Since a time interval at the time of carrying out repeating transmission is made to be determined in the 1st mode according to a random number which used as a seed a value defined peculiar to each terminal unit, Even when a notification signal transmitted from two or more terminal units collides, it is effective in enabling transmit timing of a notification signal transmitted to the next to control generating of a collision which will differ with each terminal unit and continued from these terminal units.
[0040]And since a time interval at the time of carrying out repeating transmission will be changed further each time, it is effective in becoming possible to equalize a possibility that a prime controller will receive a notification signal transmitted after a collision, about all the terminal units.
[0041]As the 2nd mode, this invention provides a bidirectional cable correspondence procedure for solving it for a short time, when a going-up signal from two or more terminal units collides in a bidirectional cable communication system which used together "polling" and a "random call method."
[0042]Namely, this invention is the time interval which the above-mentioned prime controller defined beforehand in the 1st mode mentioned above as the 2nd mode, Transmit to each of two or more above-mentioned terminal units, and a polling signal two or more above-mentioned terminal units, Respectively, when a polling signal is received from the above-mentioned prime controller, a polling reply signal which shows an answer to this polling signal, After accumulating in an inside, transmit to the above-mentioned prime controller and the above-mentioned prime controller, When a polling reply signal is received from a terminal unit which received the above-mentioned polling signal, until a terminal unit which transmitted an acceptance signal to this terminal unit, and transmitted the above-mentioned polling reply signal receives an acceptance signal from the above-mentioned prime controller, With or a time interval determined according to a random number which generated as a seed a value for which a polling reply signal accumulated in an inside was defined peculiar to this terminal unit until it became transmission frequency defined beforehand. A bidirectional cable correspondence procedure carrying out repeating transmission to the above-mentioned prime controller is provided.
[0043]In the 2nd mode, since real-time communication to a prime controller is attained from a terminal unit since a "random call method" is adopted, and it combined and "polling" is adopted, a prime controller becomes possible [detecting that failure occurred in a terminal unit or the transmission line].
[0044]In the 2nd mode, since a terminal unit does not receive an acceptance signal when it is not concerned with whether a signal which self transmitted is a notification signal, or it is a

polling reply signal and a prime controller does not receive this signal, it will carry out repeating transmission of this signal to a prime controller. Then, even if a terminal unit carries out [only the number of times defined beforehand] repeating transmission of a notification signal or the polling reply signal to a prime controller, when an acceptance signal is not received from a prime controller, it becomes possible to detect that failure occurred in a prime controller or the transmission line.

[0045]In the 1st mode, since a time interval at the time of carrying out repeating transmission is made to be determined according to a random number which used as a seed a value defined peculiar to each terminal unit, there is the same effect as the 1st mode mentioned above.

[0046]When the above-mentioned prime controller receives a notification signal from one of terminal units in the 2nd mode mentioned above, Or when abnormalities are detected inside [which was received from one of terminal units] a notification signal, transmission of the above-mentioned polling signal is suspended, and after time or arbitrary time which were set beforehand pass, transmission of the above-mentioned polling signal can be resumed.

[0047]If it does in this way, it is effective in a prime controller tending to receive a normal going-up signal, and being able to become, after a going-up signal from two or more terminal units collides. In a bidirectional cable communication system which used together "polling" and a "random call method", it is not concerned with operation of a terminal unit, but operation of such a prime controller can also be applied independently.

[0048]In the 2nd mode mentioned above, the above-mentioned prime controller can change a time interval which transmits the above-mentioned polling signal according to receiving frequency of the above-mentioned notification signal.

[0049]For example, when the above-mentioned notification signal is received, the above-mentioned prime controller changes greatly a time interval which transmits the above-mentioned polling signal, and after time or arbitrary time which were set beforehand pass, it can return a changed time interval.

[0050]If it does in this way, it is effective in a prime controller tending to receive a normal going-up signal, and being able to become, after a going-up signal from two or more terminal units collides. In a bidirectional cable communication system which used together "polling" and a "random call method", it is not concerned with operation of a terminal unit, but operation of such a prime controller can also be applied independently.

[0051]In the 1st mode and 2nd mode that were mentioned above, the above-mentioned prime controller, A priority can transmit a signal which gives a priority to a signal which should be transmitted to each of two or more above-mentioned terminal units, is accumulated in an inside, and is accumulated in an inside to high order to a terminal unit which should transmit this signal.

[0052]Since it will become possible to make high a priority of a signal with which a sex is demanded instancy if it does in this way, it is effective for realization of VOD service.

[0053]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described with reference to Drawings.

[0054]First, a 1st embodiment of this invention is described.

[0055]Drawing 1 is a lineblock diagram of the bidirectional cable communication system concerning a 1st embodiment.

[0056]In drawing 1, it is the transmission line where 10 connects a prime controller, 20 connects a terminal unit, and 51 connects between the prime controller 10 and the terminal units 20.

[0057]The going-up signal receiving means 11 which receives the going-up signal with which the prime controller 10 was transmitted from the terminal unit 20 as shown in drawing 1, The going-down signal transmission medium 12 which gets down to the terminal unit 20 and transmits a signal, An uphill signal analysis means 13 to analyze the going-up signal which the going-up signal receiving means 11 received, it should transmit to the terminal unit 20 — it gets down and a signal (a polling signal and the signal for terminal setup) is generated — it getting down and with the signal generation means 14. The acceptance signal generation means 15 which generates the acceptance signal which should be transmitted to the terminal unit 20, and the time interval which transmits a polling signal are changed, or it has a polling interval determination means 16

to stop transmission of a polling signal, and the time [to measure time] measurement means 17, and is constituted.

[0058]Information processors, such as a personal computer, can realize the prime controller 10, for example, and each means mentioned above is realized by executing the program installed in the information processor. Each means mentioned above may not be based on a program, or may be made to realize by hardware logic.

[0059]The going-down signal receiving means 21 to which the terminal unit 20 was transmitted from the prime controller 10 as shown in drawing 1 and which gets down and receives a signal, The going-up signal transmission medium 22 which goes up to the prime controller 10 and transmits a signal, A going-down signal analysis means 23 which it got down and the signal receiving means 21 received to get down and to analyze a signal, The going-up signal generation means 24 which generates the going-up signal (a random call going-up signal and a polling reply signal) which should be transmitted to the prime controller 10, The going-up signal storage means 25 which accumulates the going-up signal which the going-up signal generation means 24 generated, It has a transmission stop means 26 to stop transmission of an uphill signal, the time [to measure time] measurement means 27, the counting means 28 that calculates the transmission frequency of the going-up signal transmission medium 22, and a random number generation means 29 to generate a random number by using as a seed the value defined peculiar to the terminal unit 20, and is constituted.

[0060]Information processors, such as a small processor, can realize the terminal unit 20, for example, and each means mentioned above is realized by executing the program installed in the information processor. Installation of the program to the terminal unit 20 can be performed by transmitting this program from the prime controller 10. Each means mentioned above may not be based on a program, or may be made to realize by hardware logic.

[0061]He is trying to use together "polling" and a "random call method" in a 1st embodiment.

[0062]And the time of the terminal unit 20 going up to the prime controller 10, and the feature of a 1st embodiment being made to carry out repeating transmission of the signal, and receiving an acceptance signal from the prime controller 10, Or when only the number of times defined beforehand performs repeating transmission, it is the point of trying to suspend repeating transmission, and is the point of trying to determine the value which defined the time interval at the time of performing repeating transmission peculiar to the terminal unit 20 further according to the random number by which it was generated as a seed.

[0063]First, operation of the prime controller 10 is explained.

[0064]In order to perform communication which adopted "polling" in the prime controller 10, the polling interval determination means 16, Determine, get down the polling interval which is a time interval which transmits a polling signal to the terminal unit 20 for polling, and the signal generation means 14, When the time which the time measurement means 17 measured serves as a polling interval which the polling interval determination means 16 determined, generate, get down a polling signal and the signal transmission medium 12, The polling signal which it got down and the signal generation means 14 generated is transmitted to this terminal unit 20 via the transmission line 51.

[0065]From the terminal unit 20 which received this polling signal. Since a polling reply signal is transmitted so that it may mention later, the going-up signal receiving means 11 receives the going-up signal transmitted from the terminal unit 20, and the uphill signal analysis means 13 analyzes the going-up signal which the going-up signal receiving means 11 received.

[0066]And when recognized as the going-up signal which the going-up signal receiving means 11 received being a polling reply signal as a result of the analysis by the uphill signal analysis means 13. The acceptance signal generation means 15 generates an acceptance signal, it gets down and the signal transmission medium 12 transmits the acceptance signal which the acceptance signal generation means 15 generated to the terminal unit 20 of transmitting [a polling reply signal] origin via the transmission line 51.

[0067]After that, the candidate for polling moves to the following terminal unit 20, and a polling signal is transmitted to the terminal unit 20 for [of the following] polling like ****.

[0068]However, based on the information included in the polling reply signal, if the prime

controller 10 is required, it will perform internal processing.

[0069]When the going-up signal receiving means 11 is not able to receive a polling reply signal, it considers that the terminal unit 20 for polling is an error terminal, and error registration is performed.

[0070]After that, the candidate for polling moves to the following terminal unit 20, and a polling signal is transmitted to the terminal unit 20 for [of the following] polling like ****.

[0071]When the signal for terminal setup needs to be transmitted from the prime controller 10 to each terminal unit 20, It gets down, and the signal generation means 14 generates the signal for terminal setup, it gets down and the signal transmission medium 12 transmits the signal for terminal setup which it got down and the signal generation means 14 generated to the target terminal unit 20 via the transmission line 51.

[0072]On the other hand, in the prime controller 10, in order to perform communication which adopted the "random call method", a random call going-up signal is spontaneously transmitted from the terminal unit 20, so that it may mention later.

[0073]Then, although the going-up signal transmitted from the terminal unit 20 is received and the uphill signal analysis means 13 analyzes the going-up signal which the going-up signal receiving means 11 received, the going-up signal receiving means 11, When the going-up signal which the going-up signal receiving means 11 received has been recognized to be a normal random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The acceptance signal generation means 15 generates an acceptance signal, it gets down and the signal transmission medium 12 transmits the acceptance signal which the acceptance signal generation means 15 generated via the transmission line 51 to the terminal unit 20 of transmitting [a random call going-up signal] origin.

[0074]However, based on the information included in the random call going-up signal, if the prime controller 10 is required, it will perform internal processing.

[0075]When the going-up signal which the going-up signal receiving means 11 received has been recognized to be an unusual random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The polling interval determination means 16 extends a polling interval if needed, or stops transmission of a polling signal. However, it is not concerned with the state of an uphill signal, but also when polling with a constant interval further, it thinks.

[0076]The uphill signal analysis means 13 by checking the check of a format of the random call going-up signal which the going-up signal receiving means 11 received, and the data for error checking added to this random call going-up signal, It shall be distinguished whether it is a random call going-up signal with whether unusual it is a normal random call going-up signal. As data for these error checking, although CRC, BCC, etc. can be considered, the form in particular of the data for error checking is not limited, for example.

[0077]When the signal for terminal setup needs to be transmitted from the prime controller 10 to each terminal unit 20, It gets down, and the signal generation means 14 generates the signal for terminal setup, it gets down and the signal transmission medium 12 transmits the signal for terminal setup which it got down and the signal generation means 14 generated to the target terminal unit 20 via the transmission line 51.

[0078]To all the going-down signals which it gets down and the signal generation means 14 and the acceptance signal generation means 15 generate. When the identification number of the target terminal unit 20 is respectively contained when this going-down signal is aimed at the specific terminal unit 20, and aimed at all the terminal units 20, the special identification number which shows all the terminal units 20 is contained.

[0079]Next, operation of the terminal unit 20 is explained.

[0080]In the terminal unit 20, in order to perform communication which adopted "polling", as mentioned above, a polling signal is transmitted from the prime controller 10.

[0081]Then, although the going-down signal with which it got down and the signal receiving means 21 has been transmitted from the prime controller 10 and which got down, received the signal, got down, and got down from the signal analysis means 23, and the signal receiving means 21 received is analyzed, When recognized as it getting down and being the polling signal [signal] for other terminal units 20 which got down, and got down as a result of the analysis by the signal

analysis means 23, and the signal receiving means 21 received, i.e., the polling signal with which the own identification number is not contained, this polling signal is disregarded, but. When recognized as it being the polling signal for self, i.e., the polling signal with which the own identification number is contained, the going-up signal generation means 24 generates a polling reply signal.

[0082]The information which should be notified to the identification number and the prime controller 10 of the terminal unit 20 is included in the polling reply signal which the going-up signal generation means 24 generates.

[0083]And the going-up signal storage means 25 accumulates the polling reply signal which the going-up signal generation means 24 generated, and the going-up signal transmission medium 22 transmits the polling reply signal which the going-up signal storage means 25 is accumulating to the prime controller 10 via the transmission line 51.

[0084]Then, the interval which is a time interval until the going-up signal transmission medium 22 transmits a polling reply signal next, It is determined according to the random number which the random number generation means 29 generates, and the going-up signal transmission medium 22, When the time which the time measurement means 27 measured serves as a determined interval, the polling reply signal which the going-up signal storage means 25 is accumulating is again transmitted to the prime controller 10 via the transmission line 51.

[0085]The random number which the random number generation means 29 generates uses as a seed the value defined peculiar to the terminal unit 20, and can consider the identification number of the terminal unit 20, current time, or the thing that combined those both as this value, for example.

[0086]From the prime controller 10 which received this polling reply signal. Since an acceptance signal is transmitted as mentioned above, it gets down and the signal receiving means 21 analyzes the going-down signal which has been transmitted from the prime controller 10 and which got down from the signal analysis means 23 by receiving a signal by getting down and getting down, and the signal receiving means 21 received.

[0087]And it gets down, and when [which it got down and the signal receiving means 21 received as a result of the analysis by the signal analysis means 23] recognized as it getting down and a signal being an acceptance signal, the transmission stop means 26 stops the repeating transmission of a polling reply signal.

[0088]Whenever the going-up signal transmission medium 22 transmits a polling reply signal once, the counting means 28, When the transmission frequency which was measuring the transmission frequency and was measured reaches the number of times defined beforehand, even if an acceptance signal is not transmitted from the prime controller 10, as for the transmission stop means 26, the repeating transmission of a polling reply signal is stopped.

[0089]In order to, perform communication which adopted the "random call method" in the terminal unit 20 on the other hand, when there is information which should be notified to the prime controller 10, The going-up signal generation means 24 generates a random call going-up signal including such information, and repeating transmission of this random call going-up signal is carried out to the prime controller 10 like the case where a polling reply signal is transmitted.

[0090]From the prime controller 10 received normally, this random call going-up signal. Since an acceptance signal is transmitted as mentioned above, it gets down and the signal receiving means 21 analyzes the going-down signal which has been transmitted from the prime controller 10 and which got down from the signal analysis means 23 by receiving a signal by getting down and getting down, and the signal receiving means 21 received.

[0091]And it gets down, and when [which it got down and the signal receiving means 21 received as a result of the analysis by the signal analysis means 23] recognized as it getting down and a signal being an acceptance signal, the transmission stop means 26 stops the repeating transmission of a random call going-up signal.

[0092]By the way, in the terminal unit 20, as mentioned above, the signal for terminal setup may be transmitted from the prime controller 10.

[0093]Then, although the going-down signal with which it got down and the signal receiving means 21 has been transmitted from the prime controller 10 and which got down, received the

signal, got down, and got down from the signal analysis means 23, and the signal receiving means 21 received is analyzed, The inside information of the terminal unit 20 will be set up according to the information included in this signal for terminal setup when recognized as it being a signal for the terminal setup [get down and / signal] for self which got down, and got down as a result of the analysis by the signal analysis means 23, and the signal receiving means 21 received.

[0094]The processing flow chart which shows the flow of operation of the terminal unit 20 explained above is as being shown in drawing 7.

[0095]Namely, in drawing 7 Step 701, Are it the processing to distinguish whether the polling signal for self was received, and Step 702, Are it the processing to distinguish whether the random call going-up signal should be transmitted to the prime controller 10, and Step 703, Are the processing to accumulate the going-up signal (a polling reply signal and a random call going-up signal) which should be transmitted to the prime controller 10, and Step 704, Are the processing which ************s the transmission counter for calculating the processing which transmits the going-up signal accumulated, and transmission frequency, and Step 705, From the prime controller 10, are it the processing to distinguish whether the acceptance signal was received and Step 706, Are the processing which stops the repeating transmission of an uphill signal, and the processing which resets a transmission counter, and Step 707, Are it the processing to distinguish whether transmission frequency (value of a transmission counter) reached the number of times defined beforehand, and Step 708, It is the processing which determines the interval for carrying out repeating transmission of the uphill signal, and Step 709 shows the processing only whose determined interval distinguishes whether time passed or not.

[0096]Drawing 8 (a) is a figure showing the sequence in the case of performing communication which adopted the "random call method."

[0097]The random call going-up signal with which 811 was transmitted from the terminal unit 20 to the prime controller 10 in drawing 8 (a), The acceptance signal transmitted from the prime controller 10 to the terminal unit 20 as an answer of as opposed to the random call going-up signal 811 in 821 and 822 are the signals for terminal setup transmitted from the prime controller 10 if needed to the terminal unit 20.

[0098]The terminal unit 20 has reception of the acceptance signal 821, and is stopping transmission of a random call going-up signal.

[0099]Drawing 8 (b) is a figure showing the sequence in the case of performing communication which adopted "polling."

[0100]The polling signal with which 823 was transmitted from the prime controller 10 to the terminal unit 20 in drawing 8 (b), 812 is the polling reply signal transmitted from the terminal unit 20 to the prime controller 10 as an answer to the polling signal 823, and the acceptance signal transmitted from the prime controller 10 to the terminal unit 20 as an answer of as opposed to the polling reply signal 812 in 824.

[0101]The terminal unit 20 has reception of the acceptance signal 824, and is stopping transmission of a polling reply signal.

[0102]Drawing 8 (c) is a figure showing a sequence when a random call going-up signal collides once and the following random call going-up signal is received normally.

[0103]In drawing 8 (c), 813 is the random call going-up signal transmitted from the terminal unit 20 to the prime controller 10, and is the random call going-up signal transmitted from other terminal units 20 to the prime controller 10, and the signal which collided. The random call going-up signal with which 814 was again transmitted from the terminal unit 20, The acceptance signal transmitted from the prime controller 10 to the terminal unit 20 as an answer of as opposed to the random call going-up signal 814 in 825 and 826 are the signals for terminal setup transmitted from the prime controller 10 if needed to the terminal unit 20.

[0104]Since the terminal unit 20 cannot receive an acceptance signal after transmitting the random call going-up signal 813, After the interval t determined from the transmission time of the random call going-up signal 813 according to the generated random number passes, the random call going-up signal 814 of the again same contents is transmitted. And the terminal unit 20 has reception of the acceptance signal 825, and is stopping transmission of a random call going-up signal.

[0105]Since communication which adopted "polling" is performed according to a 1st embodiment as explained above, Since the prime controller 10 is performing communication which could detect that failure occurred in the terminal unit 20 or the transmission line 51, and adopted the "random call method", the real-time communication of it to the prime controller 10 is attained from the terminal unit 20.

[0106]Even if the terminal unit 20 carries out repeating transmission of the uphill signal to the prime controller 10 only the number of times defined beforehand according to a 1st embodiment, when an acceptance signal is not able to be received from the prime controller 10, it can detect that failure occurred in the prime controller 10 or the transmission line 51.

[0107]Since the time interval at the time of the terminal unit 20 going up and carrying out repeating transmission of the signal is made to be determined as this terminal unit 20 according to the random number which generated as a seed the value defined peculiar according to a 1st embodiment, Even when the going-up signal transmitted from two or more terminal units 20 collides, the transmit timing of the going-up signal transmitted to the next will differ with each terminal unit 20, and it becomes possible from these terminal units 20 to control generating of the continuous collision.

[0108]Since the time interval at the time of the terminal unit 20 going up and carrying out repeating transmission of the signal will be changed each time according to a 1st embodiment, it becomes possible to equalize a possibility that the prime controller 10 will receive the going-up signal transmitted after the collision, about all the terminal units 20.

[0109]At a 1st embodiment, although he is trying to use together "polling" and a "random call method", operation of the terminal unit 20 mentioned above can be carried out with the bidirectional cable communication system which adopted the "random call method."

[0110]Next, a 2nd embodiment of this invention is described.

[0111]The lineblock diagram of the bidirectional cable communication system concerning a 2nd embodiment is the same as that of drawing 1.

[0112]He is trying for a 2nd embodiment as well as a 1st embodiment to use together "polling" and a "random call method."

[0113]And the feature of a 2nd embodiment is a point he is trying to resume generating and transmission of a polling signal, after the time which the prime controller 10 suspended generating and transmission of a polling signal, and was set beforehand passes, when the going-up signal transmitted from two or more terminal units 20 collides.

[0114]In the prime controller 10, the operation which suspends generating and transmission of a polling signal, and is resumed can be made to be carried out independently of the operation which receives an uphill signal.

[0115]Since operation of the terminal unit 20 may be the same as that of a 1st embodiment, only operation of the prime controller 10 is explained.

[0116]The operation for performing communication which adopted "polling" is the same as that of a 1st embodiment.

[0117]However, when the going-up signal transmitted from two or more terminal units 20 collides in a 2nd embodiment. Since he is trying to suspend generating and transmission of a polling signal, when forbidding generating and transmission of a polling signal as it mentioned later is set up, operation for performing communication which adopted "polling" is not performed.

[0118]In the prime controller 10, in order to perform communication which adopted the "random call method", as mentioned above, a random call going-up signal is spontaneously transmitted from the terminal unit 20.

[0119]Then, although the going-up signal transmitted from the terminal unit 20 is received and the uphill signal analysis means 13 analyzes the going-up signal which the going-up signal receiving means 11 received, the going-up signal receiving means 11, When the going-up signal which the going-up signal receiving means 11 received has been recognized to be a normal random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The acceptance signal generation means 15 generates an acceptance signal, it gets down and the signal transmission medium 12 transmits the acceptance signal which the acceptance signal generation means 15 generated via the transmission line 51 to the terminal unit 20 of

transmitting [a random call going-up signal] origin.

[0120]Since it has been recognized as the going-up signal which the going-up signal receiving means 11 received as a result of the analysis according [the polling interval determination means 16] to the uphill signal analysis means 13 at this time being a normal random call going-up signal, it sets up permitting generating and transmission of a polling signal.

[0121]However, based on the information included in the random call going-up signal, if the prime controller 10 is required, it will perform internal processing.

[0122]When the going-up signal which the going-up signal receiving means 11 received has been recognized to be an unusual random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The polling interval determination means 16 sets up forbidding generating and transmission of a polling signal, and when the time which the time measurement means 17 measured reaches after that the time interval defined beforehand, it sets up permitting generating and transmission of a polling signal.

[0123]As a 1st embodiment explained, the uphill signal analysis means 13, By checking the check of a format of the random call going-up signal which the going-up signal receiving means 11 received, and the data for error checking added to this random call going-up signal, It shall be distinguished whether it is a random call going-up signal with whether unusual it is a normal random call going-up signal.

[0124]When the signal for terminal setup needs to be transmitted from the prime controller 10 to each terminal unit 20, It gets down, and the signal generation means 14 generates the signal for terminal setup, it gets down and the signal transmission medium 12 transmits the signal for terminal setup which it got down and the signal generation means 14 generated to the target terminal unit 20 via the transmission line 51.

[0125]To all the going-down signals which it gets down and the signal generation means 14 and the acceptance signal generation means 15 generate. As a 1st embodiment explained respectively, when the identification number of the target terminal unit 20 is contained when this going-down signal is aimed at the specific terminal unit 20 and it is aimed at all the terminal units 20, the special identification number which shows all the terminal units 20 is contained.

[0126]The processing flow chart which shows the flow of operation of the prime controller 10 explained above is as being shown in drawing 2.

[0127]Namely, in drawing 2 Step 500, Are the polling processing which shows drawing 5 a detailed processing flow chart, and Step 201, Are it the processing to distinguish whether the random call going-up signal was received, and Step 202, The received random call going-up signal is it the processing to distinguish whether it is a normal random call going-up signal, and Step 203, Are an acceptance signal the processing which occurs and transmits and Step 204, Are current time the processing substituted for collision time, and Step 205, From collision time, are it the processing to distinguish whether the time interval (polling stop interval) defined beforehand passed, and Step 206, It is the processing which sets up forbidding generating and transmission of a polling signal, and Step 207 is processing which sets up permitting generating and transmission of a polling signal, and Step 600 shows the signal transmission processing for terminal setup which showed the detailed processing flow chart in drawing 6.

[0128]In drawing 5, Step 501 is it processing to distinguish whether permitting generating and transmission of a polling signal is set up here, and Step 502, From the last polling time, are it the processing to distinguish whether the polling interval passed and Step 503, A polling signal is generated and transmitted to the terminal unit 20 for polling, and it is the processing which receives a polling reply signal from this terminal unit 20, and Step 504 shows the processing which substitutes current time for polling time.

[0129]As explained above, in addition to the effect by a 1st embodiment, after the collision of an uphill signal, the prime controller 10 tends to receive a normal going-up signal, and, according to a 2nd embodiment, can become.

[0130]Although the time interval until it resumes generating and transmission of a polling signal is set constant in a 2nd embodiment, It may be made to make variable a time interval until it resumes generating and transmission of a polling signal by providing the processing which uses a random number etc. and changes a polling stop interval just before Step 205 of drawing 2.

[0131]When it has been recognized as the random call going-up signal which the prime controller 10 received being an unusual random call going-up signal in a 2nd embodiment, are trying to suspend generating and transmission of a polling signal, but. This is because the prime controller 10 cannot detect actually that the going-up signal transmitted from two or more terminal units 20 collided. However, since it originates in the going-up signal transmitted from two or more terminal units 20 having collided in case [most] the prime controller 10 receives an unusual random call going-up signal actually, it is convenient. Since a possibility that a random call going-up signal and a polling reply signal will collide is also considered, It distinguishes whether the received polling reply signal is a normal polling reply signal, and when it is an unusual polling reply signal, it may be made to suspend generating and transmission of a polling signal in Step 503 of drawing 5.

[0132]Next, a 3rd embodiment of this invention is described.

[0133]The lineblock diagram of the bidirectional cable communication system concerning a 3rd embodiment is the same as that of drawing 1.

[0134]He is trying for a 3rd embodiment as well as a 1st embodiment to use together "polling" and a "random call method."

[0135]And the feature of a 3rd embodiment is a point he is trying to resume generating and transmission of a polling signal, after the time which suspended generating and transmission of a polling signal, and was set beforehand passes, when the prime controller 10 receives a random call going-up signal from the terminal unit 20. That is, even if the random call going-up signal which was received unlike a 2nd embodiment is a normal random call going-up signal, he is trying to suspend generating and transmission of a polling signal in a 3rd embodiment.

[0136]In the prime controller 10, the operation which suspends generating and transmission of a polling signal, and is resumed can be made to be carried out independently of the operation which receives an uphill signal.

[0137]Since operation of the terminal unit 20 may be the same as that of a 1st embodiment, only operation of the prime controller 10 is explained.

[0138]The operation for performing communication which adopted "polling" is the same as that of a 1st embodiment.

[0139]However, in a 3rd embodiment, when a random call going-up signal is received from the terminal unit 20. Since he is trying to suspend generating and transmission of a polling signal, when forbidding generating and transmission of a polling signal as it mentioned later is set up, operation for performing communication which adopted "polling" is not performed.

[0140]In the prime controller 10, in order to perform communication which adopted the "random call method", as mentioned above, a random call going-up signal is spontaneously transmitted from the terminal unit 20.

[0141]Then, although the going-up signal transmitted from the terminal unit 20 is received and the uphill signal analysis means 13 analyzes the going-up signal which the going-up signal receiving means 11 received, the going-up signal receiving means 11, When the going-up signal which the going-up signal receiving means 11 received has been recognized to be a normal random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The acceptance signal generation means 15 generates an acceptance signal, it gets down and the signal transmission medium 12 transmits the acceptance signal which the acceptance signal generation means 15 generated via the transmission line 51 to the terminal unit 20 of transmitting [a random call going-up signal] origin.

[0142]It sets up that the polling interval determination means 16 forbids generating and transmission of a polling signal at this time, and after that, when the time which the time measurement means 17 measured reaches the time interval defined beforehand, it sets up permitting generating and transmission of a polling signal.

[0143]However, based on the information included in the random call going-up signal, if the prime controller 10 is required, it will perform internal processing.

[0144]When the going-up signal which the going-up signal receiving means 11 received has been recognized to be an unusual random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The polling interval determination means 16 sets up forbidding

generating and transmission of a polling signal, and when the time which the time measurement means 17 measured reaches after that the time interval defined beforehand, it sets up permitting generating and transmission of a polling signal.

[0145]As a 1st embodiment explained, the uphill signal analysis means 13, By checking the check of a format of the random call going-up signal which the going-up signal receiving means 11 received, and the data for error checking added to this random call going-up signal, It shall be distinguished whether it is a random call going-up signal with whether unusual it is a normal random call going-up signal.

[0146]When the signal for terminal setup needs to be transmitted from the prime controller 10 to each terminal unit 20, It gets down, and the signal generation means 14 generates the signal for terminal setup, it gets down and the signal transmission medium 12 transmits the signal for terminal setup which it got down and the signal generation means 14 generated to the target terminal unit 20 via the transmission line 51.

[0147]To all the going-down signals which it gets down and the signal generation means 14 and the acceptance signal generation means 15 generate. As a 1st embodiment explained respectively, when the identification number of the target terminal unit 20 is contained when this going-down signal is aimed at the specific terminal unit 20 and it is aimed at all the terminal units 20, the special identification number which shows all the terminal units 20 is contained.

[0148]The processing flow chart which shows the flow of operation of the prime controller 10 explained above is as being shown in drawing 3.

[0149]Namely, in drawing 3 Step 500, Are the polling processing which showed drawing 5 the detailed processing flow chart, and Step 301, Are it the processing to distinguish whether the random call going-up signal was received, and Step 302, The received random call going-up signal is it the processing to distinguish whether it is a normal random call going-up signal, and Step 303, Are an acceptance signal the processing which occurs and transmits and Step 304, Go up current time, are the processing substituted for the signal receipt time, and Step 305, From the uphill signal receipt time, are it the processing to distinguish whether the time interval (polling stop interval) defined beforehand passed, and Step 306, It is the processing which sets up forbidding generating and transmission of a polling signal, and Step 307 is processing which sets up permitting generating and transmission of a polling signal, and Step 600 shows the signal transmission processing for terminal setup which showed the detailed processing flow chart in drawing 6.

[0150]In [as explained above] a 3rd embodiment, Since he is trying to suspend generating and transmission of a polling signal even if the random call going-up signal which was received unlike a 2nd embodiment is a normal random call going-up signal, in addition to the effect by a 2nd embodiment, it is effective in explaining below.

[0151]For for example, the Reason neither a selection mistake nor a program is pleasing when the bidirectional cable communication system concerning a 3rd embodiment realizes VOD service and the user of the terminal unit 20 chooses a certain program etc. After there is a case where he would like to cancel selection and the reproduction request of a program is transmitted from the terminal unit 20 in such a case, a certain time will be set and the deactivate request of a program will be transmitted. After the demand of a rapid traverse/rewinding was transmitted from the terminal unit 20, After the 1st random call going-up signal is transmitted from that a certain time is set and the demand of reproduction/stop may be transmitted, and the terminal unit 20, short time is set and the case where the 2nd random call going-up signal is transmitted can be considered.

[0152]Therefore, since according to a 3rd embodiment it is possible to suspend generating and transmission of a polling signal when the prime controller 10 receives the 1st random call going-up signal, the 2nd random call going-up signal can be made easy to receive.

[0153]Although the time interval until it resumes generating and transmission of a polling signal is set constant in a 3rd embodiment, It may be made to make variable a time interval until it resumes generating and transmission of a polling signal by providing the processing which uses a random number etc. and changes a polling stop interval just before Step 305 of drawing 3.

[0154]On a 3rd embodiment and further in Step 503 of drawing 5 like a 2nd embodiment, It

distinguishes whether the received polling reply signal is a normal polling reply signal, and when it is an unusual polling reply signal, it may be made to suspend generating and transmission of a polling signal.

[0155]Next, a 4th embodiment of this invention is described.

[0156]The lineblock diagram of the bidirectional cable communication system concerning a 4th embodiment is the same as that of <u>drawing 1</u>.

[0157]He is trying for a 4th embodiment as well as a 1st embodiment to use together "polling" and a "random call method."

[0158]And the feature of a 4th embodiment is the point of trying to return the frequency of generating and transmission of a polling signal, after the time which reduced the frequency of generating and transmission of a polling signal, and defined it beforehand passes, when the prime controller 10 receives a random call going-up signal.

[0159]In the prime controller 10, the operation which reduces the frequency of generating and transmission of a polling signal, and returns it can be made to be carried out independently of the operation which receives an uphill signal.

[0160]Since operation of the terminal unit 20 may be the same as that of a 1st embodiment, only operation of the prime controller 10 is explained.

[0161]The operation for performing communication which adopted "polling" is the same as that of a 1st embodiment.

[0162]However, in a 4th embodiment, since he is trying to reduce the frequency of generating and transmission of a polling signal when the random call going-up signal transmitted from the terminal unit 20 is received, as the polling interval determination means 16 was mentioned later, it changes a polling interval.

[0163]In the prime controller 10, in order to perform communication which adopted the "random call method", as mentioned above, a random call going-up signal is spontaneously transmitted from the terminal unit 20.

[0164]Then, although the going-up signal transmitted from the terminal unit 20 is received and the uphill signal analysis means 13 analyzes the going-up signal which the going-up signal receiving means 11 received, the going-up signal receiving means 11, When the going-up signal which the going-up signal receiving means 11 received has been recognized to be a normal random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The acceptance signal generation means 15 generates an acceptance signal, it gets down and the signal transmission medium 12 transmits the acceptance signal which the acceptance signal generation means 15 generated via the transmission line 51 to the terminal unit 20 of transmitting [a random call going-up signal] origin.

[0165]At this time, the polling interval determination means 16 sets up a polling interval the twice of default value, and after that, when the time which the time measurement means 17 measured reaches the time interval defined beforehand, it returns a polling interval to default value.

[0166]The default value of a polling interval is a polling interval when not receiving a random call going-up signal which it is usually at the time.

[0167]However, based on the information included in the random call going-up signal, if the prime controller 10 is required, it will perform internal processing.

[0168]When the going-up signal which the going-up signal receiving means 11 received has been recognized to be an unusual random call going-up signal as a result of the analysis by the uphill signal analysis means 13, The polling interval determination means 16 sets up a polling interval the twice of default value, and when the time which the time measurement means 17 measured reaches after that the time interval defined beforehand, it returns a polling interval to default value.

[0169]As a 1st embodiment explained, the uphill signal analysis means 13, By checking the check of a format of the random call going-up signal which the going-up signal receiving means 11 received, and the data for error checking added to this random call going-up signal, It shall be distinguished whether it is a random call going-up signal with whether unusual it is a normal random call going-up signal.

[0170]When the signal for terminal setup needs to be transmitted from the prime controller 10 to each terminal unit 20, It gets down, and the signal generation means 14 generates the signal for terminal setup, it gets down and the signal transmission medium 12 transmits the signal for terminal setup which it got down and the signal generation means 14 generated to the target terminal unit 20 via the transmission line 51.

[0171]To all the going-down signals which it gets down and the signal generation means 14 and the acceptance signal generation means 15 generate. As a 1st embodiment explained respectively, when the identification number of the target terminal unit 20 is contained when this going-down signal is aimed at the specific terminal unit 20 and it is aimed at all the terminal units 20, the special identification number which shows all the terminal units 20 is contained.

[0172]The processing flow chart which shows the flow of operation of the prime controller 10 explained above is as being shown in drawing 4.

[0173]Namely, in drawing 4 Step 500, Are the polling processing which showed drawing 5 the detailed processing flow chart, and Step 401, Are it the processing to distinguish whether the random call going-up signal was received, and Step 402, The received random call going-up signal is it the processing to distinguish whether it is a normal random call going-up signal, and Step 403, Are an acceptance signal the processing which occurs and transmits and Step 404, Are a polling interval the processing set up the twice of default value, and Step 405, Go up current time, are the processing substituted for the signal receipt time, and Step 406, From the uphill signal receipt time, are it the processing to distinguish whether the time interval (polling frequency fall interval) defined beforehand passed, and Step 407, It is the processing which returns a polling interval to default value, and Step 600 shows the signal transmission processing for terminal setup which showed the detailed processing flow chart in drawing 6.

[0174]A polling frequency fall interval is time to adopt the polling interval set up the twice of default value by Step 404, and if this time passes, a polling interval will be returned to default value by Step 406.

[0175]As explained above, according to a 4th embodiment, like the effect by a 3rd embodiment, When the random call going-up signal which the prime controller 10 received is a normal random call going-up signal, It is easy to receive the 2nd random call going-up signal that may be generated after it, and can become, and after the collision of an uphill signal, the prime controller 10 tends to receive a normal going-up signal, and can become.

[0176]In a 4th embodiment, whenever it receives a random call going-up signal, are reducing the frequency of generating and transmission of a polling signal, but. When it asks for the receiving frequency of a random call going-up signal and the receiving frequency for which it asked exceeds a reference value by calculating the number of the random call going-up signals received per unit time, it may be made to set up a polling interval the twice of default value.

[0177]In a 4th embodiment, in order to reduce the frequency of generating and transmission of a polling signal, he is trying to set up a polling interval the twice of default value, but not only this but another constant may be used, or the variable of a random number etc. may be used.

[0178]Although the time interval to which the frequency of generating and transmission of a polling signal is reduced is set constant in a 4th embodiment, It may be made to make variable the time interval to which the frequency of generating and transmission of a polling signal is reduced by providing the processing which uses a random number etc. and changes a polling frequency fall interval just before Step 406 of drawing 4.

[0179]On a 4th embodiment and further in Step 503 of drawing 5 like a 2nd embodiment, It distinguishes whether the received polling reply signal is a normal polling reply signal, and when it is an unusual polling reply signal, it may be made to reduce the frequency of generating and transmission of a polling signal.

[0180]By the way, in the prime controller 10, it transmits as a lump of the data in which it got down and the signal generation means 14 followed this fixed rule called a packet in the signal actually by getting down although it got down and the signal was eventually transmitted to the terminal unit 20 which it got down and the signal generation means 14 generated.

[0181]And it is necessary to get down and the signal generation means 14 needs to take fixed time required in order that the terminal unit 20 may perform reception between packets.

[0182]Therefore, generally, get down and transmission queue is formed in the inside of the signal transmission medium 12, It gets down, the signal generation means 14 stores the generated packet in transmission queue, and gets down from it, and for every fixed time, the signal transmission medium 12 takes out a packet from transmission queue, and transmits to the terminal unit 20.

[0183]On the other hand, when initializing the terminal unit 20 from the prime controller 10 side, it will be necessary to the terminal unit 20 to transmit mass information, including a menu screen, a program, etc., from the prime controller 10. In such a case, mass information will be divided into two or more packets, and will be transmitted to the terminal unit 20. Many packets will be stored also in transmission queue when transmitting many packets. Although the buffer of composition so that the information stored first may come out first called FIFO (first-in first-out) realizes, transmission queue, When a lot of packets are stored, there is a problem that time until the packet stored later is transmitted will become long.

[0184]In the system which realized service as which a sex is especially required instancy like VOD service, when transmission queue is covered with many packets for a certain Reason, there is a problem that the response to the request from the user of the terminal unit 20 will become late.

[0185]Then, in the 1st embodiment – 4th embodiment in order to solve such a problem, He forms several transmission queue with which it gets down and priorities differ inside the signal transmission medium 12, and is trying for a priority to transmit preferentially the packet stored in high transmission queue to the terminal unit 20 so that it may explain below.

[0186]Drawing 11 gets down and is an internal configuration figure of the signal transmission medium 12.

[0187]in drawing 11 –- 1101 — as for cue and 1112, an end pointer and 1103 are [a start pointer and 1114] usually data transmission parts an end pointer and 1113 a start pointer and 1111 priority queues and 1102.

[0188]The priority queues 1101 are the transmission queue for storing the packet which transmits preferentially, and the cue 1111 is usually the transmission queue for storing the packet which does not need to transmit preferentially.

[0189]As shown in drawing 11, the priority queues 1101, It comprises a ring buffer, the storing position of the packet stored in the beginning among the packets stored in the priority queues 1101 is shown by the start pointer 1103, and the storing position of the packet stored at the end is shown by the end pointer 1102.

[0190]The cue 1111 usually comprises a ring buffer like the priority queues 1101, Usually, the storing position of the packet stored in the beginning among the packets stored in the cue 1111 is shown by the start pointer 1113, and the storing position of the packet stored at the end is shown by the end pointer 1112.

[0191]It gets down, and as for the signal generation device 14, this packet is stored in the storing position shown by the end pointer 1102 in the priority queues 1101 when it is the generated packet whose signal (packet) it should get down and should transmit preferentially. It gets down, and after storing of a packet, the signal generation means 14 carries forward the end pointer 1102 so that the storing position of one-piece beyond may be shown.

[0192]When the packet which it got down and the signal generation device 14 generated is a packet which does not need to transmit preferentially, Usually, in addition it stores this packet in the storing position shown by the end pointer 1112 in the cue 111, it gets down, and the signal generation means 14 carries forward the end pointer 1112 after storing of a packet so that the storing position of one-piece beyond may be shown.

[0193]Now, get down and in the signal transmission medium 12 the data transmission part 1114, When the priority queues 1101 are checked to fixed timing and the packet is stored in the priority queues 1101, A packet is read from the storing position shown by the start pointer 1103, and after carrying forward the start pointer 1103 so that the storing position of one-piece beyond may be shown, the read packet is transmitted to the terminal unit 20. When the packet is not stored in the priority queues 1101 as for the data transmission part 1114, Usually, if the cue 1111 is checked and the packet is usually stored in the cue 111, A packet is read from the

storing position shown by the start pointer 1113, and after carrying forward the start pointer 1113 so that the storing position of one-piece beyond may be shown, the read packet is transmitted to the terminal unit 20.

[0194]The processing flow chart which shows the flow of operation of the data transmission part 1114 explained above is as being shown in drawing 12.

[0195]Namely, in drawing 12 Step 1201, Are it the processing to distinguish whether the packet is stored in the priority queues 1101, and Step 1202, It is the processing which transmits the packet stored in the priority queues 1101, and Step 1203 is processing which distinguishes whether the packet is usually stored in the cue 1111, and Step 1204 is processing which transmits the packet usually stored in the cue 1111.

[0196]As explained above, even when dividing a lot of information into two or more packets and transmitting to the terminal unit 20 by forming the transmission queue with which priorities differ, it becomes possible to transmit the information as which a sex is required instancy to the terminal unit 20.

[0197]For example, when realizing VOD service, the prime controller 10, The packet which should transmit to the terminal unit 20 which performed the request as which instancy nature, such as a reproduction request and a deactivate request, is required, If it is made to store in the priority queues 1101 and the other packet (for example, mass information, including a menu screen required since the terminal unit 20 is initialized, a program, etc.) is usually stored in the cue 1111, It is possible to avoid the fault that the response to the request from the user of other terminal units 20 becomes late, during initialization of a certain terminal unit 20.

[0198]Although he is trying to form the priority queues 1101 and the transmission queue which usually has two priorities of the cue 1111, it may be made to form three or more transmission queue with which priorities differ in the explanation mentioned above according to a sex the instancy needed.

[0199]the art of forming several transmission queue with which priorities differ -- the conventional "polling" and a "random call method" -- on the other hand -- or it is effective even if it carries out with the bidirectional cable communication system which adopted both.

[0200]Now, the bidirectional cable communication system concerning the 1st embodiment – 4th embodiment, When realizing VOD service, it is suitable, and hereafter, with the bidirectional cable communication system concerning a 1st embodiment, the case where VOD service is realized is made into an example, and a concrete system configuration and operation are explained.

[0201]Drawing 13 is a concrete lineblock diagram of the CATV system which is a bidirectional cable communication system which realized VOD service.

[0202]In drawing 13, 10 a prime controller and 20a-20n A terminal unit, 1330 — as for an RF modulation machine and 1351, a bidirectional spectral separation mixer and 1341 are [a RS-232C cable and 1353] the Ethernet cables a coaxial cable and 1352 the FSK modem and 1342 a video server and 1340.

[0203]First, the case where the user of the terminal unit 20a performs reproduction operation is made into an example, and operation of a CATV system is explained.

[0204]The terminal unit 20a will transmit a random call going-up signal to the prime controller 10, if a user performs reproduction operation. In addition to the identification number of the terminal unit 20a, the identifier which shows that it is a reproduction request, and the identifier which shows a program to reproduce are contained in this random call going-up signal.

[0205]The random call going-up signal transmitted from the terminal unit 20a, Via the bidirectional spectral separation mixer 1340 and the FSK modem 1341, it is transmitted to the prime controller 10 and the prime controller 10, If a random call going-up signal is received as a normal random call going-up signal from the terminal unit 20a, will transmit an acceptance signal to the terminal unit 20a via the FSK modem 1341 and the bidirectional spectral separation mixer 1340, and. The reproduction instruction signal equivalent to the received random call going-up signal is transmitted to the video server 1330 by communication by Ethernet.

[0206]If a reproduction instruction signal is received from the prime controller 10, the video server 1330, After starting reproduction of the program as which reproduction was required and carrying out the frequency modulation of the video signal and audio signal which were

reproduced with the RF modulation machine 1342 based on this reproduction instruction signal, it transmits to the terminal unit 20a via the bidirectional spectral separation mixer 1340.

[0207]The video server 1330 is communication by Ethernet as an answer to a reproduction instruction signal, and transmits a status reply signal to the prime controller 10. The channel information which shows the channel with which the reproduced program is transmitted is included in this status reply signal.

[0208]Then, the prime controller 10 will transmit the signal for terminal setup equivalent to the received status reply signal to the terminal unit 20a via the FSK modem 1341 and the bidirectional spectral separation mixer 1341, if a status reply signal is received from the video server 1330.

[0209]The terminal unit 20a will set up inside information tune in automatically the channel which the channel information included in the received signal for terminal setup shows, if the signal for terminal setup is received from the prime controller 10.

[0210]By operation explained above, the user of the terminal unit 20a becomes possible [viewing and listening to a desired program].

[0211]It is made not to interfere mutually — the frequency of an uphill signal shall be 71.0 MHz, for example, it shall get down from it, and the frequency of a signal shall be 44.9 MHz, for example.

[0212]Drawing 14 (a) is a sequence diagram showing the communication performed according to the operation mentioned above.

[0213]The random call going-up signal with which 1411 was transmitted from the terminal unit 20a to the prime controller 10 in drawing 14 (a), The acceptance signal transmitted from the prime controller 10 to the terminal unit 20a as an answer of as opposed to the random call going-up signal 1411 in 1421, The reproduction instruction signal with which 1431 was transmitted from the prime controller 10 to the video server 1330, The status reply signal transmitted from the video server 1330 to the prime controller 10 as an answer of as opposed to the reproduction instruction signal 1431 in 1441 and 1451 are the signals for terminal setup transmitted from the prime controller 10 to the terminal unit 20a.

[0214]Since the prime controller 10 received the random call going-up signal 1411 which the terminal unit 20a transmitted to the 1st time in drawing 14 (a) and the terminal unit 20a has received the acceptance signal 1421 which the prime controller 10 transmitted, The terminal unit 20a is stopping transmission of a random call going-up signal.

[0215]Then, next, the random call going-up signal which the terminal unit 20a transmitted explains the operation at the time of colliding with the random call going-up signal which other terminal units 20b transmitted using the sequence diagram shown in drawing 14 (b).

[0216]The random call going-up signal with which 1412 was transmitted to the 1st time from the terminal unit 20a to the prime controller 10 in drawing 14 (b), The random call going-up signal with which 1413 was transmitted to the 1st time from the terminal unit 20b to the prime controller 10, The random call going-up signal with which 1414 was transmitted to the 2nd time from the terminal unit 20a to the prime controller 10, and 1415 are the random call going-up signals transmitted to the 2nd time from the terminal unit 20b to the prime controller 10.

[0217]The random call going-up signal 1412 which the terminal unit 20a transmitted to the 1st time as a 1st embodiment explained, When the random call going-up signal 1413 which the terminal unit 20b transmitted to the 1st time collides, Since the data of the two random call signals 1412-1413 will be destroyed, the prime controller 10 cannot receive a normal random call going-up signal, and does not transmit an acceptance signal.

[0218]Then, since neither of terminal units 20a and 20b can receive an acceptance signal from the prime controller 10, the repeating transmission of a random call going-up signal is not suspended, but they transmit a random call going-up signal to the prime controller 10 again.

[0219]As a 1st embodiment explained, at this time the terminal unit 20a, After the time on which it decides according to the random number which generated the own identification number as a seed passes, Transmit to the prime controller 10 and the 2nd random call going-up signal 1414 the terminal unit 20b, Since the 2nd random call going-up signal 1415 is transmitted to the prime controller 10 after the time on which it decides according to the random number which

generated the own identification number as a seed passes, As shown in <u>drawing 14 (b)</u>, the timing to which the two random call going-up signals 1414-1415 are transmitted will shift.

[0220]Although the random call going-up signal 1414 which the terminal unit 20a transmitted to the 2nd time is transmitted in the example shown in <u>drawing 14 (b)</u> to timing earlier than the random call going-up signal 1415 which the terminal unit 20b transmitted to the 2nd time, Depending on the result of a random number, it may become reverse.

[0221]The acceptance signal transmitted from the prime controller 10 to the terminal unit 20a in <u>drawing 14 (b)</u> as an answer of as opposed to the random call going-up signal 1414 in 1424, The acceptance signal transmitted from the prime controller 10 to the terminal unit 20b as an answer of as opposed to the random call going-up signal 1415 in 1425, The reproduction instruction signal with which 1434 was transmitted from the prime controller 10 to the video server 1330 (reproduction instruction signal equivalent to the random call going-up signal 1414), The reproduction instruction signal with which 1435 was transmitted from the prime controller 10 to the video server 1330 (reproduction instruction signal equivalent to the random call going-up signal 1415), The status reply signal transmitted from the video server 1330 to the prime controller 10 as an answer of as opposed to the reproduction instruction signal 1434 in 1444, The status reply signal transmitted from the video server 1330 to the prime controller 10 as an answer of as opposed to the reproduction instruction signal 1435 in 1445, The signal for terminal setup with which 1454 was transmitted from the prime controller 10 to the terminal unit 20a (signal for terminal setup equivalent to the status reply signal 1444), 1455 is the signal for terminal setup (signal for terminal setup equivalent to the status reply signal 1445) transmitted from the prime controller 10 to the terminal unit 20b.

[0222]Since the prime controller 10 can receive the 2nd transmitted random call going-up signal 1414 as a normal random call going-up signal from the terminal unit 20a, The acceptance signal 1424 is transmitted to the terminal unit 20a, and the reproduction instruction signal 1434 equivalent to the received random call going-up signal 1414 is transmitted to the video server 1330.

[0223]Then, the terminal unit 20a will suspend the repeating transmission of a random call going-up signal, if the acceptance signal 1424 is received from the prime controller 10.

[0224]On the other hand, if the reproduction instruction signal 1434 is received from the prime controller 10, as mentioned above, the video server 1330, Start reproduction of the program as which reproduction was required based on this reproduction instruction signal 1434, and after carrying out frequency modulation with the RF modulation machine 1342, transmit to the terminal unit 20a, and the video signal and audio signal which were reproduced. The status reply signal 1444 is transmitted to the prime controller 10 as an answer to the reproduction instruction signal 1434.

[0225]Then, the prime controller 10 will transmit the signal 1454 for terminal setup equivalent to the received status reply signal 1444 to the terminal unit 20a, if the status reply signal 1444 is received from the video server 1330.

[0226]Since the terminal unit 20a will set up inside information tune in automatically the channel which the channel information included in the received signal 1454 for terminal setup shows if the signal 1454 for terminal setup is received from the prime controller 10, The user of the terminal unit 20a becomes possible [viewing and listening to a desired program].

[0227]Similarly, since the prime controller 10 can receive the 2nd transmitted random call going-up signal 1415 as a normal random call going-up signal from the terminal unit 20b, The acceptance signal 1425 is transmitted to the terminal unit 20b, and the reproduction instruction signal 1435 equivalent to the received random call going-up signal 1415 is transmitted to the video server 1330.

[0228]Then, the terminal unit 20b will suspend the repeating transmission of a random call going-up signal, if the acceptance signal 1425 is received from the prime controller 10.

[0229]On the other hand, if the reproduction instruction signal 1435 is received from the prime controller 10, as mentioned above, the video server 1330, Start reproduction of the program as which reproduction was required based on this reproduction instruction signal 1435, and after carrying out frequency modulation with the RF modulation machine 1342, transmit to the

terminal unit 20b, and the video signal and audio signal which were reproduced. The status reply signal 1445 is transmitted to the prime controller 10 as an answer to the reproduction instruction signal 1435.

[0230]Then, the prime controller 10 will transmit the signal 1455 for terminal setup equivalent to the received status reply signal 1445 to the terminal unit 20b, if the status reply signal 1445 is received from the video server 1330.

[0231]Since the terminal unit 20b will set up inside information tune in automatically the channel which the channel information included in the received signal 1454 for terminal setup shows if the signal 1455 for terminal setup is received from the prime controller 10, The user of the terminal unit 20b becomes possible [viewing and listening to a desired program].

[0232]Although the above explanation explained the case where two random call going-up signals collided, even if it is a case where a polling reply signal is included in the going-up signal which collided even if it is a case where three or more random call going-up signals collide, the same operation as **** is performed.

[0233]
[Effect of the Invention]Although there is a danger that the going-up signal transmitted from two or more terminal units will collide, in communication by the "random call method" which provides no restriction in the timing which goes up from a terminal unit to a prime controller, and transmits a signal, In the bidirectional cable communication system which adopted the "random call method" at least according to this invention, When a collision occurs, the going-up signal transmitted from two or more terminal units these terminal units, Respectively, are made to carry out repeating transmission of the uphill signal, and since he is trying for the random number by which it was generated as a seed to determine a value peculiar to each terminal unit, the transmission interval in that case, It becomes possible to avoid the collision of the continuous going-up signal, and it becomes possible to equalize a possibility that a prime controller will receive the going-up signal transmitted after the collision, about all the terminal units.

[0234]According to this invention, a prime controller becomes possible [discovering the abnormalities of a transmission route] by using together "polling" and a "random call method", securing a sex instancy. And in the bidirectional cable communication system which used together "polling" and a "random call method", When a prime controller goes up from a terminal unit and a signal is received, it becomes possible to reduce the danger of suspending transmission of a polling signal or reducing transmission frequency of a polling signal and that an uphill signal will collide since it is making.

[0235]Therefore, since this invention becomes possible [solving it for a short time] when the going-up signal from two or more terminal units collides, it is effective in order to realize VOD service as which a sex is required especially instancy.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original
precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The lineblock diagram of the bidirectional cable communication system concerning a
1st embodiment.
[Drawing 2]The processing flow chart which shows the flow of operation of the prime controller
in a 2nd embodiment.
[Drawing 3]The processing flow chart which shows the flow of operation of the prime controller
in a 3rd embodiment.
[Drawing 4]The processing flow chart which shows the flow of operation of the prime controller
in a 4th embodiment.
[Drawing 5]The detailed processing flow chart of polling processing.
[Drawing 6]The detailed processing flow chart of the signal transmission processing for terminal
setup.
[Drawing 7]The processing flow chart which shows the flow of operation of the terminal unit in a
1st embodiment.
[Drawing 8]The sequence diagram of the communication performed between the prime controller
and terminal unit in a 1st embodiment.
[Drawing 9]The processing flow chart which shows the flow of operation of the prime controller
in the bidirectional cable communication system which adopted the conventional "polling", and
the sequence diagram showing the communication performed between a prime controller and a
terminal unit.
[Drawing 10]The processing flow chart which shows the flow of operation of the prime controller
in the bidirectional cable communication system which adopted the conventional "random call
method", and the sequence diagram showing the communication performed between a prime
controller and a terminal unit.
[Drawing 11]It gets down and is an internal configuration figure of a signal transmission medium.
[Drawing 12]The processing flow chart which shows the flow of operation of a data transmission
part.
[Drawing 13]The concrete lineblock diagram of the CATV system which is a bidirectional cable
communication system which realized VOD service.
[Drawing 14]The sequence diagram showing the communication performed between the prime
controller and terminal unit in a CATV system, and the communication performed between a
prime controller and a video server.
[Description of Notations]
10 — A prime controller, 11 — An uphill signal receiving means, 12 — Get down and Signal
transmission medium, 13 — An uphill signal analysis means, 14 — It gets down and is a signal
generation means and 15. — Acceptance signal generation means, 16 — A polling interval
determination means, 17 — A time measurement means, 20, 20a–20n — Terminal unit, 21 — It
gets down and is a signal receiving means and 22. — An uphill signal transmission medium, 23 —
Get down and Signal analysis means, 24 — An uphill signal generation means, 25 — An uphill
signal storage means, 26 — Uphill signal transmission means for stopping, 27 — A time
measurement means, 28 — The number—of—times counting means of uphill signal transmission,

29 -- Random number generation means, 51 -- The transmission line, 1101 -- Priority queues, 1102 -- End pointer, 1103 -- A start pointer, 1111 -- It is usually cue and 1112. -- End pointer, 1113 [-- A bidirectional spectral separation mixer, 1341 / -- The FSK modem, 1342 / -- An RF modulation machine, 1351 / -- A coaxial cable, 1352 / -- A RS-232C cable, 1353 / -- Ethernet cable.] -- A start pointer, 1114 -- A data transmission part, 1330 -- A video server, 1340

[Translation done.]